

REMARKS

Nonentry of Reply of December 12, 2003

Applicants respectfully request that the Reply and Declaration filed on December 12, 2003 not be entered with this Request for Continued Examination. Instead, Applicants submit this Reply under 37 CFR 1.114 and Declaration with the RCE to replace the Reply and Declaration filed on December 12, 2003.

Interview

Applicants thank Examiner Lee for his time and consideration in the personal interview held on October 3, 2003. In the interview, Applicants presented arguments against combining the references to arrive at the present invention. No agreement was reached at the interview.

Status of the Claims

Claims 1-3, 5-7 and 10-36 are pending in this application. No claims have been canceled. No claims have been amended. Claims 16-36 have been added. Support for the new claims 16-31 is found, for example, in the paragraph bridging pages 26 and 27 and the first and second full paragraphs on page 30 and at page 38, lines 16 to 20 of the specification. Support for new claims 32 to 36 is found at page 3, line 14 of the specification and claims 1 and 5. No new matter has been added by the above new claims.

Rejection under 35 USC 103(a)

The Examiner rejects claims 1-3, 5-7 and 10-15 as obvious over USP 6,433,062 to Tasaka et al. (Tasaka '062) in view of USP 5,221,781 to Aida et al. (Aida '781). Applicants traverse the rejection and respectfully request the withdrawal thereof.

Present Invention

The present invention is directed to a fire-retardant resin composition and a molded article using the said composition, which have excellent characteristics, such as resistance to whitening when bent, mechanical strength (e.g. tensile strength), flexibility and abrasion resistance. The present invention is prepared by heating and kneading the specific component (A) including the ingredients (a), (b), (c) and (d) together with an organic peroxide (e), a crosslinking aid (f), and a metal hydrate (B) that has been surface-treated in a specific ratio with a specific silane coupling agent having a vinyl group or an epoxy group at its terminal, which forms a chemical bond of a proper bonding strength between the resin component (A) and the metal hydrate (B), as well as to form a crosslinked structure in the resin component (A). The formation of the chemical bond and the formation of the partial crosslinked structure can be obtained by heating and kneading components (A) and (B), where component (A) includes ingredients (a) to (d) in the presence of the organic peroxide (e) and the crosslinking aid (f).

As described in the first full paragraph on page 39 of the specification, it is assumed that the thermoplastic resin component (A) and the metal hydrate (B) bond to each other via the silane coupling agent having a specific terminal of a vinyl or epoxy group. In order to form this bond, it is necessary to mix components (A) and (B) before or simultaneously with the partial crosslinking reaction of the component (A). If the mixing occurs too late in the reaction, then the resulting product will not have the excellent properties of the present invention, such as improved tensile strength. See for example, comparative example 9 in the attached Declaration of Mr. Kobayashi. The particular mixing as described in the present invention allows component (A) to admix with a very large amount of metal hydrate (B) without losing mechanical strength or deteriorating physical properties.

The present invention has such remarkable characteristics because the thermoplastic resin component is a specific one as defined in the present claims. Also, the metal hydrate and the resin components are bonded to each other via the silane coupling agent. Therefore, when heating and kneading the mixture of the metal hydrate and the resin components in the presence of an organic peroxide, the extrusion processibility is not deteriorated even when a large amount of metal hydrate is added. Excellent mechanical properties and abrasion-resistance are achieved by the

specific components. See page 39, lines 7-24 of the present specification.

Cited Prior Art

Aida '781 discloses a thermoplastic resin composition. However, the composition and method of making the composition in Aida '781 are completely different from the composition and method of making the composition of the present invention, particularly since Aida '781 does not use any organic peroxide in the crosslinking reaction.

Applicants submit that Aida '781 cannot be used in combination to arrive at the present invention because Aida '781 teaches away from an element of the present invention. Column 8, lines 54 to 64 of Aida '781 discloses a drawback in the conventional crosslinking method when using an organic peroxide. Instead, Aida '781 recommends using a dihydroaromatic compound, an ether compound, a tetrahydroaromatic compound, or a cyclopentane compound as the crosslinking agent together with a polyfunctional monomer. Please also see column 2, lines 17 to 57 and 65 to 68 of Aida '781.

Applicants submit that Aida '781 also teaches away from using an organic peroxide as the crosslinking agent in the comparative examples. See also comparative example 10 in Aida '781. Crosslinking Agent J1 is used, instead of C2 and the polyfunctional monomer G2 as in Example 18. See Table 2, in columns 13 to 16 of

Aida '781. See the results in Table 2 where the organic peroxide used in Comparative Example 10 yields a very low tensile strength at 0.4 kg/mm².

On the other hand, Tasaka '062 discloses using an organic peroxide as an essential component of making the composition in Tasaka '062. Tasaka '062 discloses at column 7, lines 46 to 50 that if the amount of the component (e), the inorganic filler, exceeds 100 parts by weight, the mechanical strength of the elastomer composition obtained is very low and its hardness is so high that its flexibility is lost and the moldability of the composition is deteriorated.

Applicants submit that the teachings in Tasaka '062 and the teachings in Aida '781 both teach away from the present invention. In the present invention, the metal hydrate (B) in an amount of not only 50 parts by weight or more, but less than 100 parts by weight, but also 100 parts by weight or over up to 300 parts by weight can be contained in the composition. However, the problem described in Tasaka '062 is the problem that can be solved with the present invention.

As such, Applicant submit that one of ordinary skill in the art would not be motivated to combine Aida '781 with Tasaka '062 to arrive at the present invention, particularly since Aida '781 teaches away from using an organic peroxide. Thus, Applicants respectfully submit that no prima facie case of obviousness has

been presented since there is no motivation to combine the references.

However, assuming *arguendo* that a *prima facie* case of obviousness has been established, Applicants submit that the present invention possesses unexpected superior properties over the prior art.

The present invention has excellent resistant to whitening, excellent mechanical strength, excellent flexibility and excellent abrasion resistance. This is obtained by using a specific composition of component (A) having ingredients (a) to (d); the organic peroxide (e); the crosslinking aid (f); and the metal hydrate (B), which has been pretreated in a specific ratio with a silane coupling agent having a vinyl or epoxy group at its terminal, where each component is in a specific amount.

Aida '781 illustrates their invention in their Examples. The Examples disclose a magnesium hydroxide treated by an aliphatic acid (trade name, Kisma 5B) as a metal hydrate. See Examples 15, 16, 17, 18, 20, 21 and 22 at column 12, lines 34-36 of Aida '781. On the other hand, in the present specification, Applicants compare the present invention with the illustrative example in Aida '781. See Comparative Example 1 where a magnesium hydroxide is treated by an aliphatic acid (Kisma 5B). The test results are described in the specification.

Aida '781 fails to disclose or suggest the excellent properties exhibited by the present invention by using an organic peroxide in the crosslinking reaction, as well as surface treating the metal hydrate in a specific ratio with a specific silane coupling agent.

Please see the Declaration under Rule 132 of Mr. Kobayashi submitted herewith to further explain the superior properties and unexpected results of the present invention.

Mr. Kobayashi explains the examples in the specification, specifically Example 1, which represents the invention and Comparative Examples 1 and 9. The examples were prepared according to page 2 of the Declaration. Please note that component (B), magnesium hydroxide, whose surface had been treated with a vinyl silane (B-1) was used with Example 1 and Comparative Example 9 and magnesium hydroxide whose surface had been treated with an aliphatic acid (B-2) was used for Comparative Example 1. Please see Table B in the Declaration at page 6. Please also note that component (B) was added later in the reaction in Comparative Example 9 as compared to Example 1 and Comparative Example 1. Please see Table B for a comparison of specific properties. Note that Example 1 has far superior properties as compared to Comparative Examples 1 and 9. Clearly, these superior properties exhibited by Example 1 (the present invention) can be obtained by heating and kneading

components (A) and (B), before or simultaneously with the partial crosslinking reaction of component (A) in the presence of the organic peroxide (e).

In addition to the above, please also see Example 10, which contains the metal hydrate (B) in a relative amount of 163 parts by weight of 100 parts by weight of the thermoplastic resin composition and more than half the amount of the metal hydrate (B) was made up of $Mg(OH)_2$ pretreated with a silane coupling agent having a vinyl group at its terminal. Comparative Example 101 contained the same amount of metal hydrate component (B), however less than half the amount of the metal hydrate was made up of $Mg(OH)_2$ pretreated with such a silane coupling agent. Please see Table B for the test results.

In summary, in every test for each of the examples, the present invention having all the metal hydrate $Mg(OH)_2$ or a specific ratio as defined in the claims that was pretreated by a specific silane coupling agent having a vinyl group or an epoxy group at its terminal had far superior properties. As such, Applicants submit that even if a prima facie case of obviousness has been established, Applicants overcome it with the Declaration under 37 CFR 1.132 attesting to unexpected superior results of the present invention over the cited art.

Conclusion


As Applicants have addressed and overcome all rejections in the Office Action, Applicants respectfully request that the rejections be withdrawn and that the claims be allowed.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Kecia Reynolds (Reg. No. 47,021) at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

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